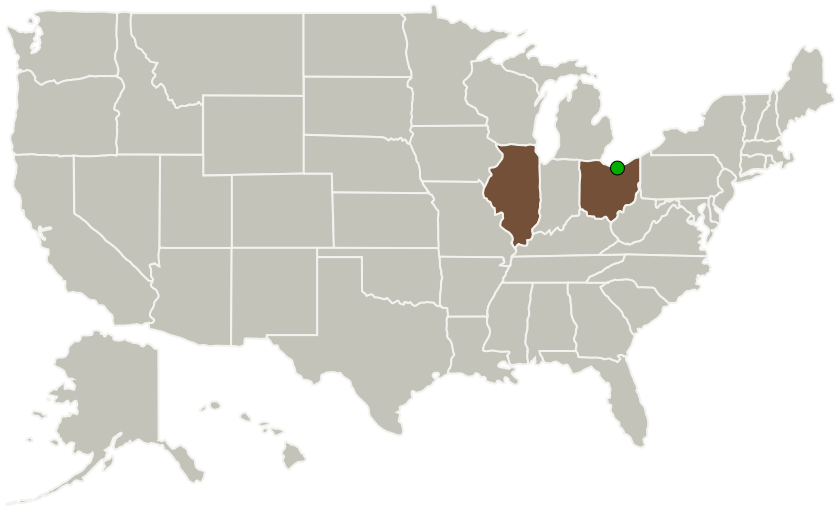
High-Efficiency, Radiation-Hard, Lightweight IMM Solar Cells, Phase II

Completed Technology Project (2015 - 2019)

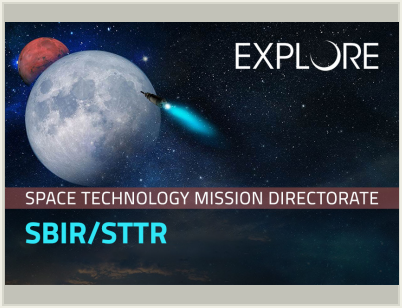
Project Introduction

In the proposed Phase II project, MicroLink and its collaborator, Rochester Institute of Technology (RIT), will incorporate quantum dots (QDs) in the GaAs and InGaAs subcells of an InGaP/GaAs/InGaAs triple-junction solar cell to increase the radiation tolerance and thereby improve the end-of-life performance of the solar cell by >5%. The quantum dot solar cell will be grown in an inverted metamorphic (IMM) format on GaAs and will be compatible with MicroLink's epitaxial lift-off (ELO) process. The resulting solar cells will be lightweight, flexible, and radiation tolerant. Mechanically, they will resemble a sheet of thin metal foil. Innovative light management techniques such as reflective metal back contact and silver nanoparticle-enhanced reflectivity will be employed to increase absorption in the solar cell

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
MicroLink Devices, Inc.	Lead Organization	Industry Minority-Owned Business	Niles, Illinois
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio



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Completed Technology Project (2015 - 2019)

Primary U.S. Work Locations	
Illinois	Ohio

Project Transitions

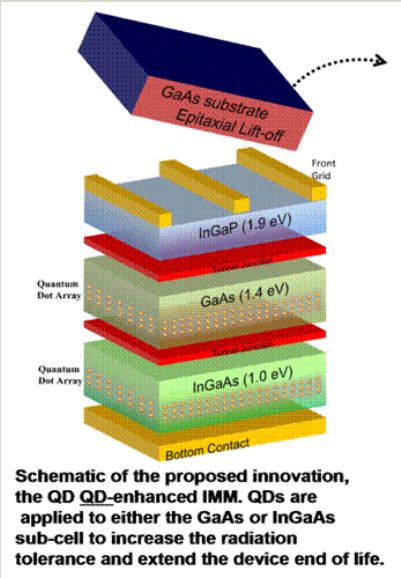
May 2015: Project Start

June 2019: Closed out

Closeout Documentation:

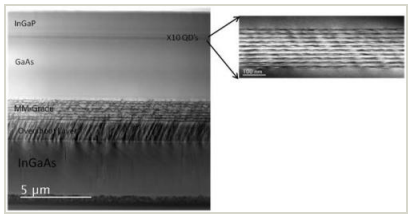
- Final Summary Chart*(https://techport.nasa.gov/file/138162)*

Images



Schematic of the proposed innovation, the QD QD-enhanced IMM. QDs are applied to either the GaAs or InGaAs sub-cell to increase the radiation tolerance and extend the device end of life.

Briefing Chart
High-Efficiency, Radiation-Hard, Lightweight IMM Solar Cells Briefing Chart
(https://techport.nasa.gov/image/133533)



Final Summary Chart Image
High-Efficiency, Radiation-Hard, Lightweight IMM Solar Cells, Phase II Project Image
(https://techport.nasa.gov/image/132990)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
MicroLink Devices, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Sudersena Rao Tatavarti Bharatam

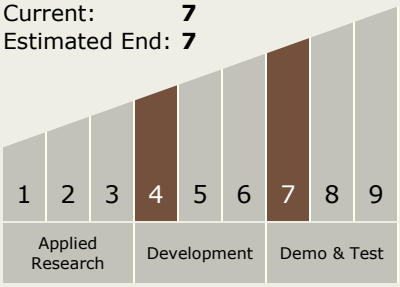
Co-Investigator:
Rao Tatavarti

High-Efficiency, Radiation-Hard, Lightweight IMM Solar Cells, Phase II

Completed Technology Project (2015 - 2019)

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System